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AN 08-40RC65-2

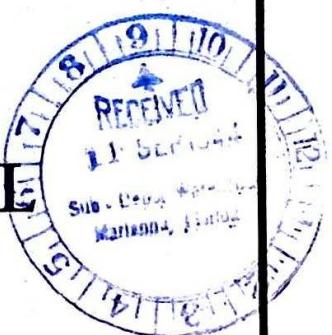
HANDBOOK OF OPERATING  
INSTRUCTIONS

FOR

TARGET CONTROL  
TRANSMITTING  
EQUIPMENTS

RC-65 and RC-65-Z

RECEIVED  
1 SEP 1944  
Sub-Division Engineering  
McKinley Field, Florida



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**LIST OF REVISED PAGES ISSUED**

**NOTE:** A heavy black vertical line, to the left of the text on revised pages, indicates the extent of the revision. This line is omitted where more than 50 percent of the page is revised.

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## **SAFETY NOTICE**

This equipment employs high voltages which are dangerous and may be fatal if contacted by operating personnel. Extreme caution should be exercised when working with the equipment.



## *Destruction of Abandoned Materiel in the Combat Zone*

In case it should become necessary to prevent the capture of this equipment and when ordered to do so, DESTROY IT SO THAT NO PART OF IT CAN BE SALVAGED, RECOGNIZED, OR USED BY THE ENEMY. BURN ALL PAPERS AND BOOKS.

*Means:-*

1. Explosives, when provided.
2. Hammers, axes, sledges, machetes, or whatever heavy object is readily available.
3. Burning by means of incendiaries such as gasoline, oil, paper, or wood.
4. Grenades and shots from available arms.
5. Burying all debris or disposing of it in streams or other bodies of water, where possible and when time permits.

*Procedure:-*

1. Obliterate all identifying marks. Destroy nameplates and circuit labels.
2. Demolish all panels, castings, switch- and instrument-boards.
3. Destroy all controls, switches, relays, connections, and meters.
4. Rip out all wiring and cut interconnections of electrical equipment. Smash gas, oil, and water-cooling systems in gas-engine generators, etc.
5. Smash every electrical or mechanical part, whether rotating, moving, or fixed.
6. Break up all operating instruments such as keys, phones, microphones, etc.
7. Destroy all classes of carrying cases, straps, containers, etc.
8. Bury or scatter all debris.

**DESTROY EVERYTHING!**



## *Unsatisfactory Report*

*For U. S. Army Air Force Personnel:-*

In the event of malfunctioning, unsatisfactory design, or unsatisfactory installation of any of the component units of this equipment, or if the material contained in this book is considered inadequate or erroneous, an Unsatisfactory Report, AAF Form No. 54, or a report in similar form, shall be submitted in accordance with the provisions of Army Air Force Regulation No. 15-54, listing:

1. Station and organization.
2. Nameplate data (type number or complete nomenclature if nameplate is not attached to the equipment).
3. Date and nature of failure.
4. Airplane model and serial number.
5. Remedy used or proposed to prevent recurrence.
6. Handbook errors or inadequacies, if applicable.

*For U. S. Navy Personnel:-*

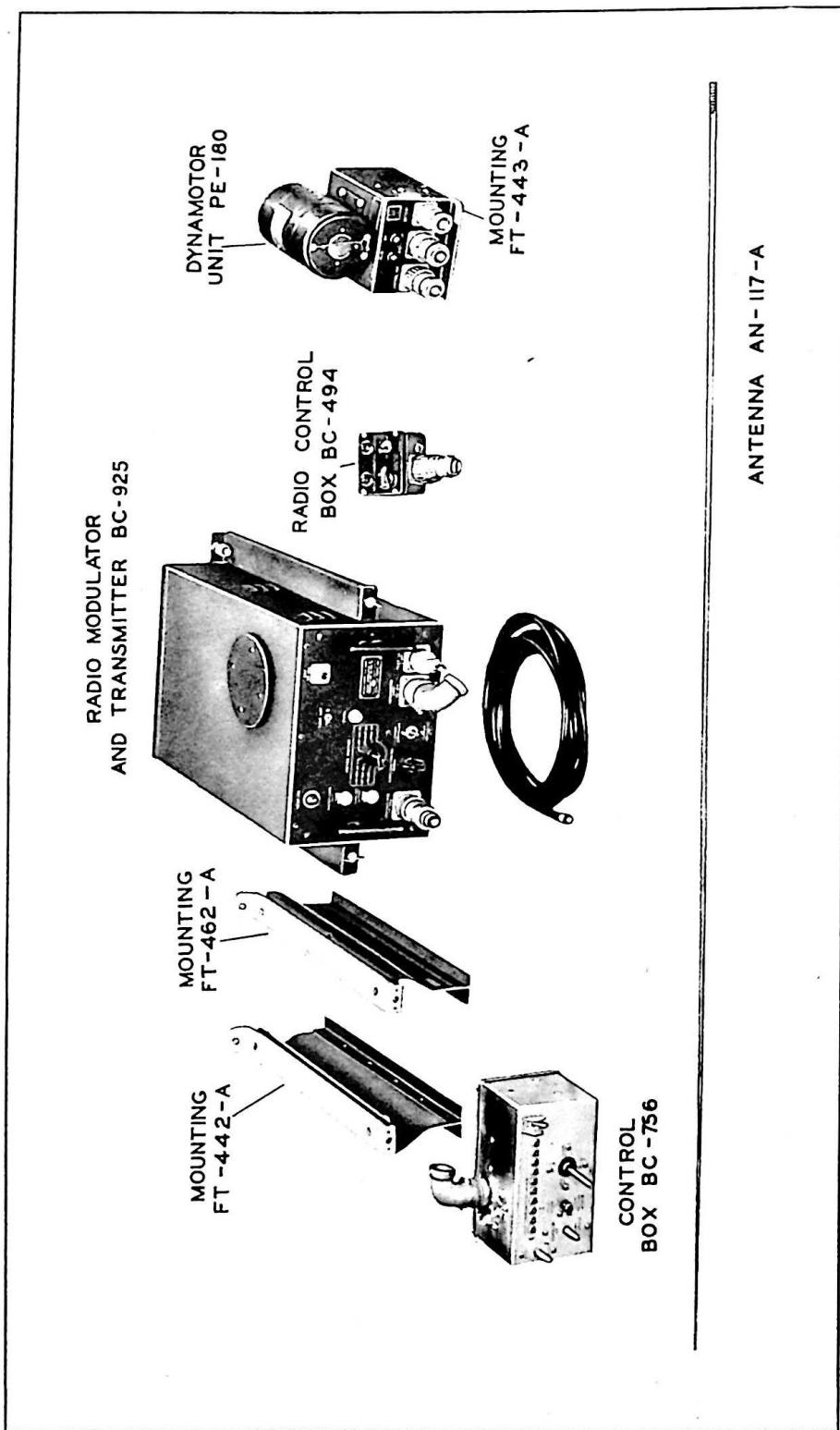
Report of failure of any part of this equipment during its guaranteed life shall be made on N. Aer. 4112, "Report of Unsatisfactory or Defective Material," or a report in similar form, and forwarded in accordance with the latest instructions of the Bureau of Aeronautics. In addition to other distribution required, one copy shall be furnished to the inspector of Naval Materiel (location to be specified) and the Bureau of Ships. Such reports of failure shall include:

1. Reporting activity.
2. Nameplate data.
3. Date placed in service.
4. Part which failed.
5. Nature and cause of failure.
6. Replacement needed (yes—no).
7. Remedy used or proposed to prevent recurrence.

*For British Personnel:-*

Form 1022 procedure shall be used when reporting failure of radio equipment.

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*Figure 1—Complete Target Control Transmitting Equipment RC-65*

**SPECIAL NOTICE**

Since Target Control Transmitting Equipments RC-65 and RC-65-Z are basically the same (except for a 28-volt system for the former and a 14-volt system for the latter), this book has been prepared to apply to both equipments. Components are identical except for the following, which are not interchangeable:

**TARGET CONTROL  
TRANSMITTING EQUIPMENT  
RC-65**

Radio Modulator and Transmitter BC-925.....Radio Modulator and Transmitter BC-925-Z  
Radio Control Box BC-494.....Radio Control Box BC-494-Z  
Dynamotor Unit PE-180.....Dynamotor Unit PE-180-Z

To facilitate use of the book, only Target Control Transmitting Equipment RC-65 and its components are referred to in the text and shown in illustrations, except where differences in the equipment require mention of Target Control Transmitting Equipment RC-65-Z.

**TARGET CONTROL  
TRANSMITTING EQUIPMENT  
RC-65-Z**

**SECTION I  
GENERAL DESCRIPTION****1. GENERAL.**

- a. This handbook describes the installation, adjustment, operation, and limited repair of Target Control Transmitting Equipment RC-65.
- b. Purpose of the equipment (see fig. 1) is to control large airborne targets. The useful control range varies with the type of installation and the type of receiving equipment used.

c. The equipment is used with Radio Receiver and Selector BC-617-T1 or BC-617-T2 and will be used with Radio Receiver and Selector BC-617-Z.

**2. PRINCIPAL COMPONENTS.**

a. EQUIPMENT SUPPLIED.—Principal components supplied with Target Control Transmitting Equipment RC-65 are listed in the following table.

Quantity	Name of Unit	Overall Dimensions (inches)	Weight (lbs.)
1	Radio Modulator and Transmitter BC-925 (Radio Modulator and Transmitter BC-925-Z is used with Target Control Transmitting Equipment RC-65-Z)	21 x 9 x 16	35
1	Mounting FT-442-A	2 x 6 x 18	2.3
1	Mounting FT-462-A	2 x 6 x 18	2.3
1	Radio Control Box BC-494 (Radio Control Box BC-494-Z is used with Target Control Transmitting Equipment RC-65-Z)	3 1/2 x 3 1/2 x 4	.9
1	Control Box BC-756	5 1/2 x 6 3/4 x 8 1/2	8.0
1	Antenna AN-117-A	72	
1	Cord CD-861	*	*
1	Cord CD-862-A	See figure 7	1.25
1	Cord CD-866 or	See figure 7	2.0
1	Cord CD-866-B	See figure 7	3.0
1	Cord CD-918-A or	See figure 7	1.25
1	Cord CD-918	See figure 7	1.1
1	Cord CD-919 or	See figure 7	1.0
	Cord CD-919-A	See figure 7	2.0

Quantity	Name of Unit	Overall Dimensions (inches)	Weight (lbs.)
1	Dynamotor Unit PE-180 (Dynamotor Unit PE-180-Z is used with Target Control Transmitting Equipment RC-65-Z)	6 x 9½ x 8	15
1	Mounting FT-443-A	6 x 11 x ½	.69
†	Plug AN-3106-20-1S		
†	Plug AN-3106-22-5P		
†	Receptacle AN-3100-20-1P		
†	Receptacle AN-3100-22-5S		
†	Adapter AN-3068-12		
†	Cap and Chain No. 9760-20, manufactured by American Phenolic Corp., Chicago, Illinois		
†	Cap and Chain No. 9760-22, manufactured by American Phenolic Corp., Chicago, Illinois		
†	Loop-Type Tube Clip AC-755-4		
†	Loop-Type Tube Clip AC-755-5		
†	Loop-Type Tube Clip AC-755-8		
†	Loop-Type Tube Clip AC-755-10		
†	Flexible Conduit	½ in dia.	*
†	90° Conduit Coupling AN-3062-12		
1	Coupling Nut AN-3054-12		
1	Ferrule No. 9775-12-8, manufactured by American Phenolic Corp., Chicago, Illinois		
‡	Test Unit I-201		
‡	Test Unit BC-914		
‡	Cord CD-866	See figure 7	
‡	Cord CD-866-B	See figure 7	

\* Size and weight varies with individual installation requirements.

† Quantity varies with individual installation requirements.

‡ This unit is supplied with a group of equipments, and is used with, but is not part of, Target Control Transmitting Equipment RC-65 or RC-65-Z.

**b. EQUIPMENT REQUIRED BUT NOT SUPPLIED.**  
PLIED.—The equipment required but not supplied with Target Control Transmitting Equipment RC-65 is listed in the following table.

Quantity	Name of Unit	Required Characteristics
1	Cord CD-307-A	135 inches long
1	Cord CD-307-A	84 inches long
1	Cord CD-316-A	60 inches long
1	Cord CD-316-A	200 inches long
1	Headset HS-23	
1	Insulator IN-79	
*	Wire W-106-A	

\* Length of wire depends upon individual requirements of each installation.

### 3. POWER REQUIREMENTS.

Target Control Transmitting Equipment RC-65 requires 28 volts direct current and draws 12 amps current, whereas Target Control Transmitting Equipment RC-65-Z requires 12 volts direct current and draws 23.5 amps current.

## SECTION II INSTALLATION AND ADJUSTMENT

### 1. INSTALLATION OF TARGET CONTROL TRANSMITTING EQUIPMENT RC-65.

a. MOUNTINGS FT-442-A AND FT-462-A.—Installation information is supplied in figure 2. Since Radio Modulator and Transmitter BC-925 is mounted on these units, choose a location which will place them in a normally horizontal plane, and which will allow clear space in front of the transmitter unit so it may be removed from its case. Place the radio modulator and transmitter on these mountings and lock the case to the mounts by means of the wing-type fasteners.

b. DYNAMOTOR UNIT PE-180.—Choose a location for the dynamotor so the armature shaft will be in a horizontal plane, and Cord CD-919 will reach from it to the transmitter unit. Using figure 3 as a guide, install Mounting FT-443-A. Place the dynamotor unit on the mounting and secure it by means of the snapslide fasteners. Safety-wire the fasteners.

c. RADIO CONTROL BOX BC-494.—Install Radio Control Box BC-494, using figure 4 as a guide. Make sure Cord CD-918 is of sufficient length to connect the control box to Dynamotor Unit PE-180. Place the "BATTERY" switch on the radio control box in the "OFF" position.

d. CONTROL BOX BC-756.—Install Control Box BC-756, using figure 5 as a guide. Make sure Cord CD-866 or CD-866-B will reach from the control box to Radio Modulator and Transmitter BC-925. Place the "OPERATE" switch (located on Control Box BC-756) in the "OFF" position.

e. ANTENNA AN-117-A.—Install Antenna AN-117-A and Insulator IN-79. Make sure Cord CD-861 will reach from the antenna to the transmitter unit. (See fig. 6.)

### f. RADIO MODULATOR AND TRANSMITTER BC-925.

(1) Release the two snap fasteners at the rear of the case of Radio Modulator and Transmitter BC-925 by giving them a quarter turn counterclockwise with a screwdriver. Remove the chassis from the case by grasping the handles and pulling forward.

#### CAUTION

Be careful to hold the rear of the chassis to prevent it from dropping when it clears the case.

(2) Check to see that:

(a) The crystal and tubes are secure in their sockets.

(b) The master modulation control, located on top of the chassis, is set to the yellow dot (5 kc) position.

(3) Replace the chassis of the radio modulator and transmitter in its case and fasten it by turning the fasteners at the rear of the case a quarter-turn clockwise.

### g. CORD CONNECTIONS.

(See fig. 7.)

#### Note

Cords and cables should be anchored so they will be kept free from grease and oil.

(1) Connect Cord CD-861 from Antenna AN-117-A to the socket marked "ANT CD-861" on Radio Modulator and Transmitter BC-925.

(2) Connect Cord CD-862-A to the primary power source and to the socket marked "BATTERY" on Dynamotor Unit PE-180.

(3) Connect one end of Cord CD-866 or CD-866-B to the socket marked "CONTROL BOX CD-866" on Radio Modulator and Transmitter BC-925 and connect the other end to the socket on Control Box BC-756.

(4) Connect one end of Cord CD-919 to the socket marked "MOD. TRANS" on the dynamotor unit; connect the other end to the socket marked "DYNAMOTOR UNIT CD-919" on Radio Modulator and Transmitter BC-925.

(5) Connect one end of Cord CD-918 to the socket marked "CONTROL BOX" on Dynamotor Unit PE-180; connect the other end to the socket on Radio Control Box BC-494.

b. 12- OR 24-VOLT OPERATION.—Safety-wire the switch on Control Box BC-756 in the 24-volt position for Target Control Transmitting Equipment RC-65, or in the 12-volt position for Target Control Transmitting Equipment RC-65-Z.

### 2. ADJUSTMENT.

## WARNING

Operation of this equipment involves the use of high voltages which are dangerous to life. Personnel must observe all safety regulations at all times.

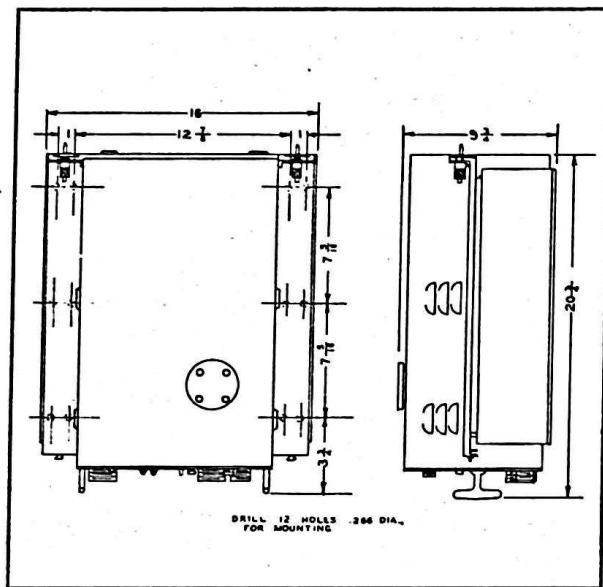
a. PROCEDURE.—When operating the equipment for the first time, or after maintenance work, or when it is doubtful whether the equipment is properly tuned to the antenna, proceed as follows:

(1) Connect the cord from Test Unit I-201 to the socket marked "TEST UNIT I-201" on Radio Modulator and Transmitter BC-925. (Remove cap first.)

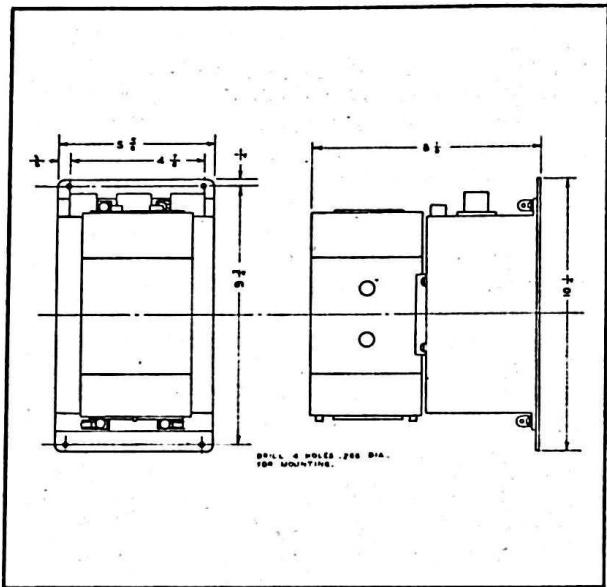
(2) Place the "BATTERY" switch on Radio Control Box BC-494 in the "ON" position.

**Section II**

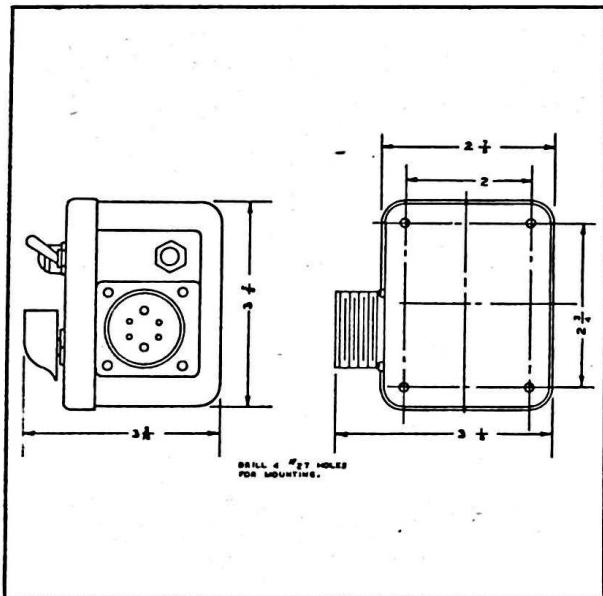
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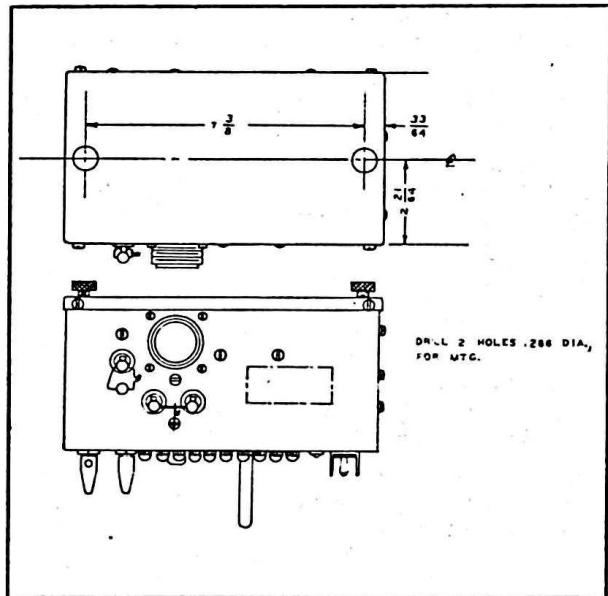
**Figure 2—Radio Modulator and Transmitter BC-925,  
Mounting Dimensions**



**Figure 3—Dynamotor Unit PE-180 with Mounting  
FT-443-A, Mounting Dimensions**



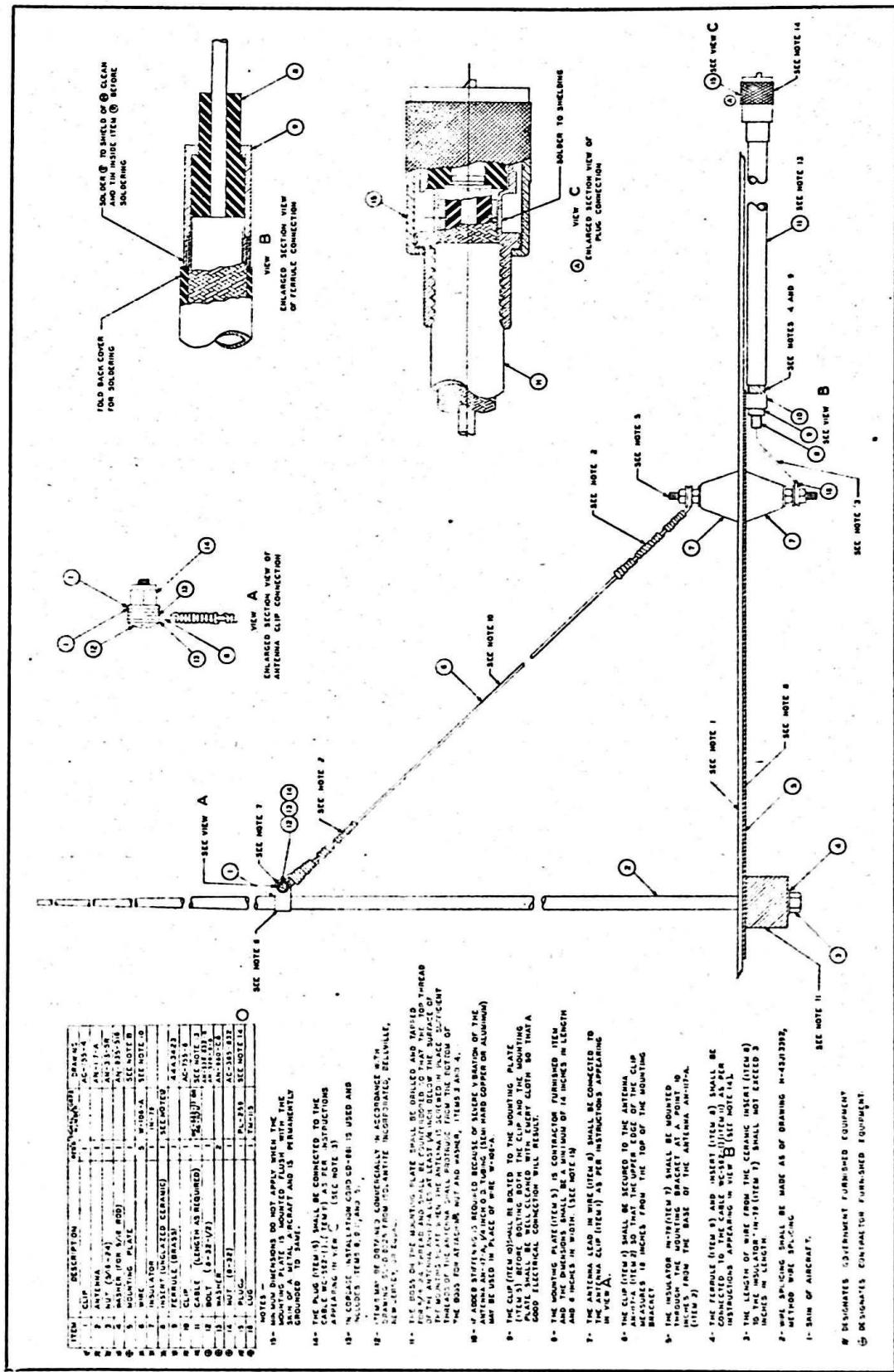
**Figure 4—Radio Control Box BC-494, Mounting  
Dimensions**



**Figure 5—Control Box BC-756, Mounting  
Dimensions**

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SECTION II



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**Figure 6—Antenna AN-117-A, Mounting Instructions**

(3) After 30 seconds place the "OPERATE" switch on Control Box BC-756 in the "ON" position.

(4) With a screwdriver, tune the "FINAL" adjustment, located on the front of the radio modulator and transmitter, to minimum reading on the O-150 milliammeter on Test Unit I-201. Slightly adjust the "TUNE ANT" control, also located on the front of the radio modulator and transmitter, and retune "FINAL." Note the new plate current reading. Having noted an increase or decrease in minimum plate current, proceed to readjust so that the minimum plate current is adjusted to 95 milliamperes, or slightly less, with a pronounced upswing each side of resonance as the "FINAL" is tuned.

**Note**

O plate current reading indicates no excitation; check primary power source polarity. If this is correct, refer to the handbook of maintenance instructions for this equipment.

(5) Note the reading on the O-5 milliammeter with the "METER SWITCH" on the radio modulator and transmitter in "FINAL GR." position. If this reading is less than 1 millampere, the equipment is improperly aligned in its preliminary stages. For corrective measures see the handbook of maintenance instructions for this equipment.

(6) Turn the "OPERATE" switch on Control Box BC-756 to "OFF."

(7) Turn the "BATTERY" switch on Radio Control Box BC-494 to "OFF."

**b. LOW TEMPERATURE ADJUSTMENTS.—**

When the equipment has been subjected to extremely low temperatures immediately preceding operation, place the "OPERATE" switch on Control Box BC-756 in the "OFF" position and place the "BATTERY" switch on Radio Control Box BC-494 in the "ON" position. Allow the equipment to heat up for approximately 15 minutes. This will allow the audio oscillators to operate closer to their nominal frequencies.

## SECTION III OPERATION

### **1. OPERATION PROCEDURE.**

This equipment operates very simply. After the steps outlined in section II, paragraph 2, have been accomplished, the following procedures should be used to operate the equipment.

**Note**

When the "CARRIER CONTROLLED" position is used, the equipment is transmitting only when modulated by some audio tone. This is used when it is not desired to have carrier signal on the air at all times.

When the "CARRIER CONTINUOUS" position is used, the transmitter carrier signal is on at all times.

**a. "CARRIER CONTINUOUS."****(1) TO START.**

(a) Turn the "BATTERY" switch on Radio Control Box BC-494 to "ON."

(b) After about 30 seconds turn the "OPERATE" switch on Control Box BC-756 to "ON."

(c) Proceed to operate the control stick and stepping controls on Control Box BC-756 as stated in paragraph 2 below.

(2) TO STOP.—Turn the "BATTERY" and "OPERATE" switches to "OFF."

**b. "CONTROLLED CARRIER."**—To operate the equipment as a controlled carrier transmitting equipment, remove the safety wire from the "CARRIER

"CONTINUOUS-CARRIER CONTROLLED" switch on the front panel of Radio Modulator and Transmitter BC-925, and place the switch in the "CARRIER CONTROLLED" position. Proceed as outlined in the paragraph immediately above.

### **2. FUNCTIONS OF SWITCHES ON CONTROL BOX BC-756.**

The control of the airplane is accomplished mainly by the operation of three main switches on Control Box BC-756. The selection of the auxiliary function is made by the "STEP-RESET" switch. The airplane is operated by coordination of the control stick ("RIGHT-LEFT" and "UP-DOWN" switches) and the "INCREASE-DECREASE" switch.

a. The "STEP-RESET" switch makes possible the control of auxiliary functions of the airplane such as throttle, brakes, propeller pitch, flaps, and gear. To select the function desired push the "RESET" switch once and the No. 1 or "AUTO" lamp will light. Push the "STEP" switch up once and the No. 2 or "TURN" lamp will light. To select any function, push the "STEP" switch up until the light for the desired function comes on. In order to return to "AUTO" function after having pushed the "STEP" switch up two or more times, press the "RESET" switch down. This returns operation to "AUTO" function. The auxiliary function chosen by the "STEP-RESET" switch is indicated by the indicator lamps.

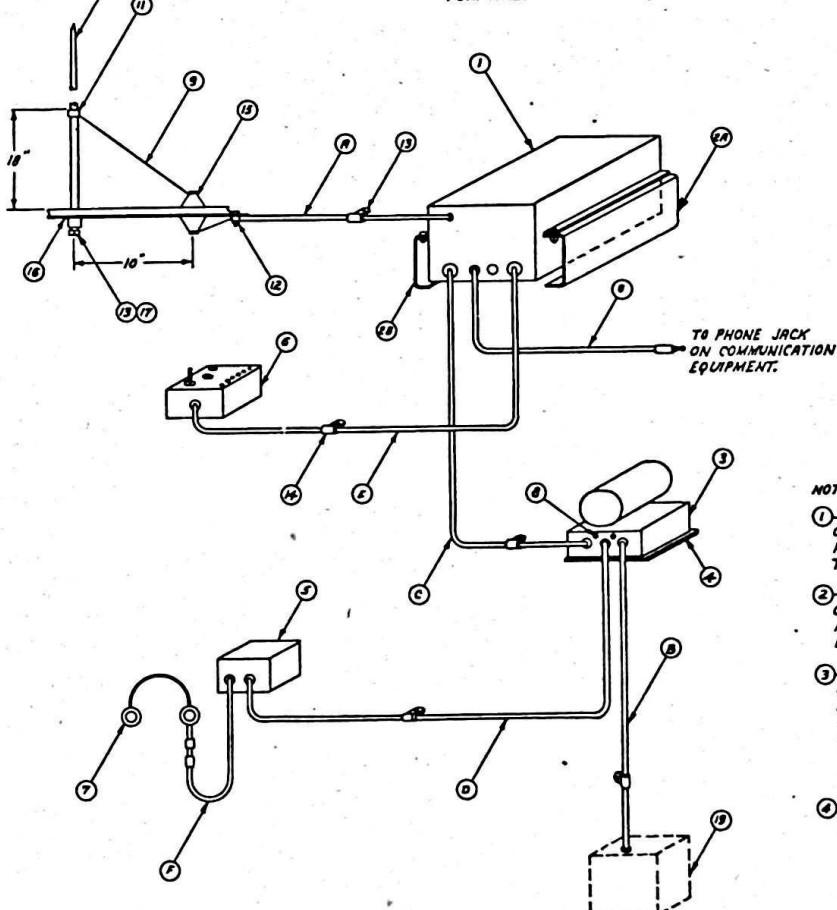
b. The control stick controls the altitude of the airplane. The "RIGHT-LEFT" positions provide con-

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SECTION III

ITEM NO.	QUANTITY	DESCRIPTION	CONTROL AIRPLANE TYPE						Dwg. or SPEC. NO.	WEIGHT	LARGEST DIMENSIONS	EQUIPMENT PART OF		
			L-1	L-1A	A-7	C-7	Type & Length No.	Type & Length No.	Type & Length No.					
(A) 1	CORD	CD-861 48"	CD-861 48"	CD-861 156"	CD-861 116"		SC-D-65	0.3 lbs					RC-65	
(B) 1	CORD	CD-862 48"	CD-862 48"	CD-862 48"	CD-862 72"		SC-D-65	0.3 lbs					RC-65	
(C) 1	CORD	CD-913-A 34"	CD-913-A 34"	CD-913-A 52"	CD-913-A 23"		SC-D-65	0.3 lbs					RC-65	
(D) 1	CORD	CD-918 60"	CD-918 60"	CD-918 34"	CD-918 36"		SC-D-65	0.3 lbs					RC-65	
(E) 1	CORD	CD-866-B 93"	CD-866-B 93"	CD-866-B 114"	CD-866-A 145"		SC-D-65	0.3 lbs					RC-65	
(F) 1	CORD	CD-307A 48"	CD-307A 48"	CD-307A 72"	CD-307A 48"		SC-D-65	0	5				RC-65	
(G) 1	CORD	CD-316A 96"	CD-316A 85"	CD-316A 52"	CD-316A 165"		SC-D-65	0	7				RC-65	
(1)	1	FM MODULATOR TRANSMITTER UNIT	BC-925-Z	BC-925	BC-925	BC-925			SC-F-1751	40	0	22"	16 1/2"	RC-65
(2)	1	MOUNTING	FT-443-A	FT-443-A	FT-443-A	FT-443-A			SC-F-1751	—				RC-65
(3)	1	DYNAMOTOR	PE-180-2	PE-180	PE-180	PE-180			SC-F-1751	15	0	10"	6"	RC-65
(4)	1	DYNAMOTOR BRACKETS	FT-443-A	FT-443-A	FT-443-A	FT-443-A			SC-F-1751	—				RC-65
(5)	1	CONTROL ROD	BC-494-2	BC-494	BC-494	BC-494			SC-F-1751	0	12	4"	4"	RC-65
(6)	1	CONTROL BOX	BC-756	BC-756	BC-756	BC-756			SC-F-1751	5	4	6"	5"	RC-65
(7)	1	HEADSET	HS-23 OR HS-33	HS-23 OR HS-33	HS-23 OR HS-33	HS-23 OR HS-33			SC-F-1751	0	10			RC-65
(8)	10	FUSE	FU-48	FU-48	FU-48	FU-48			SC-F-1751	0	2			RC-65
(9)	42	WIRE	W-106A 5'	W-106A 5'	W-106A 5'	W-106A 5'			SC-F-1751	0	1			RC-65
(10)	1	ANTENNA WHIP	AN-117-A	AN-117-A	AN-117-A	AN-117-A			SC-F-1751	1	0		72"	RC-65
(11)	1	LOOP CLIP	RC-755-4	RC-755-4	RC-755-4	RC-755-4			SC-F-1751	0	1			RC-65
(12)	1	LOOP TYPE	RC-755-3	RC-755-3	RC-755-3	RC-755-3			SC-F-1751	0	1			RC-65
(13)	3	LOOP CLIPS	RC-755-8	RC-755-8	RC-755-8	RC-755-8			SC-F-1751	0	1			RC-65
(14)	12	LOOP CLIP	RC-755-10	RC-755-10	RC-755-10	RC-755-10			SC-F-1751	0	1			RC-65
(15)	1	INSULATOR	IN-79	IN-79	IN-79	IN-79			SC-F-1751	0	1			RC-65
(16)	1	MOUNTING BRACKET	—	—	—	—				*				*
(17)	1	WASHER, LOCK FOR 1/8" ROD	FOR 1/8" ROD	FOR 1/8" ROD	FOR 1/8" ROD	FOR 1/8" ROD				*				*
(18)	1	NUT	#-24	#-24	#-24	#-24				*				*
(19)	1	JUNCTION BOX	—	—	—	—				*				*

\* — DESIGNATES EQUIPMENT NOT FURNISHED BY SIGNAL CORPS BUT TO BE FURNISHED BY THE ARMY AIR FORCE OR AIRPLANE MANUFACTURER



NOTES:-

(1) FOR INSTALLATION OF TARGET CONTROL TRANSMITTING EQUIPMENT RC-65 AND RC-65-Z IN CONTROL TRUCKS, SEE DWG SC-F-6101

(2) FOR INSTALLATION OF TARGET CONTROL RECEIVING EQUIPMENT RC-64 AND RC-64-Z, SEE SIGNAL CORPS DWG SC-F-6034, OR RC DWG S44G3460.

(3) FOR TESTING RC-65 OR RC-65-Z EQUIPMENTS AFTER INSTALLATION, USE TEST EQUIPMENT IE-72, U.S. ARMY SPEC. 271-1755. THIS EQUIPMENT IS NORMALLY FURNISHED IN THE RATIO OF ONE TEST EQUIPMENT FOR EVERY TWO RC-65 EQUIPMENTS.

(4) FOR OPEN-WIRING CABLE INSTALLATIONS SEE DWG S44D3461.

Figure 7—Target Control Transmitting Equipment RC-65, Cording Diagram

**RESTRICTED**

trol of the rudder except when the auxiliary function "TURN" is operated, in which case the stick controls only the ailerons. This arrangement permits greater banking on the turns.

c. The "INCREASE-DECREASE" switch controls the auxiliary function chosen by the "STEP-RESET" switch. In the "AUTO" and "TURN" positions it controls the throttle. In the "BRAKE" position it con-

trols brake and so on for the additional auxiliary functions.

d. The "HOLD DOWN TO STEP BEYOND ARROW" switch is used as a safety measure. The "STEP-RESET" switch cannot be operated beyond the "BRAKE" position without this switch being held down.

## SECTION IV EMERGENCY OPERATION AND REPAIR

### 1. EMERGENCY OPERATION.

This equipment is so designed that improper sequence of operating procedure will not result in improper functioning of the equipment, providing all steps are completed. In case of emergency, should the

system fail to operate in the "CARRIER CONTROLLED" position of the "CARRIER CONTINUOUS-CARRIER CONTROLLED" switch, it may be possible to resume operation by throwing the switch to the "CARRIER CONTINUOUS" position.